

EmComm Field Operations Manual and Handbook (Karo-Echo)

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I. What to Do First in Case of an Emergency

- 1) Check that you and your family are safe and secure before you respond as an EmComm volunteer.
- 2) Check that your property is safe and secure before you respond as an EmComm volunteer.
- 3) Monitor _____ (put your assigned local EmComm emergency net frequency here).
- 4) Follow the instructions you receive from the Net Control Station (NCS) in charge on the above frequency.
- 5) Contact your local Emergency Coordinator, or his/her designee, for further instructions.

II. Monitor Designated Frequencies:

146.415 MHz (KARO/ECHO Primary) Simplex
146.475 MHz (KARO/ECHO Secondary) Simplex (County OES Designated)
145.110 MHz (West CoCo County EmComm Repeater) - offset – 600 KHz, PL 82.5
(If the repeater is down, transmit and receive on the output frequency – 145.110 MHz
Simplex)
3.893 MHz LSB (CoCo County OES)
146.505MHz County OES Martinez simplex
147.450 MHz Richmond simplex
147.495 MHz San Pablo simplex
147.570 MHz Pinole CERT simplex
146.490 MHz Crockett simplex
147.540 MHz Hercules simplex
147.480 MHz Berkeley simplex (NALCO ARES/RACES)
440.900 MHz (TX +5 PL 131.8) NALCO ARES/RACES
146.880 MHz (repeater TX -600 PL 77) Oakland ARES/RACES

Your local area FRS/GMRS designated primary channel _____

Initial Action Checklist

The net control station (NCS) on the designated emergency net frequency will provide additional instructions, including information on frequencies used for other resource and tactical nets. Normally, a resource net will enroll volunteers and provide information on how you can assist. If needed, establish a tactical net frequency, a resource and/or logistics net on separate frequencies as per directions given by the NCS.

- Be prepared to operate. Check all equipment, batteries, and connections.
- Check-in with your assigned contact. Deploy to assignment with a basic “Ready” kit.
- Do not self-deploy to pre-assigned locations unless directed by NCS.
- Obtain a tactical call sign for your location/assignment from NCS.
- Initiate personal event log (use form at end of this booklet).
- Enter assigned frequency(s) on log sheet and on emergency/frequency plan.
- Use log form to record messages handled.
- Use a formal message form when a precise record is required (example IC-213)
- Use tactical call sign for your location, and observe FCC’s 10-minute ID rule.
- Monitor your assigned frequency at all times. Notify NCS if you have to leave.

Section III: Basic Deployment Equipment Checklist

When responding to an emergency event, or even a training exercise, there is a minimum set of equipment and personal gear you should bring with you to get the job done. Basic items include:

- 2-meter hand-held
- 2-meter mag-mount antenna, coax, or portable antenna and mount
- Earphone/headset
- Paper and pencil/clipboard with extra IC-213 forms
- ARES/RACES ID card CERT ID card, and Drivers License
- Extra batteries,
- Cigarette lighter adapter to radios, smartphone, powerpole connector adapters
- Cell phone and charger
- Appropriate clothing, eyeglasses, flashlight/head-lantern.
- Water

The majority of these items should be kept in a “Ready Kit.” Just pick it up on your way out the door for deployment. The above are the bare essentials for an 8-hour assignment or less.

You might also consider the items in the GO-KIT checklist available on KARO/ECHO Wiki. designed to allow you to stay in the field under more severe conditions or for longer periods. See Karo-Echo.net

Specifically https://karo-echo.net/index.php?title=Appendix:Battery_Emergency_Power_Operations

And [https://karo-echo.net/index.php?title=EMcomm_Operators_Go-Kit_\(Jumpkit\)](https://karo-echo.net/index.php?title=EMcomm_Operators_Go-Kit_(Jumpkit))

Best to see [Appendix B](#) in this Handbook for the progressive EMComm Go-Kit

IVa: Types of Emergency Nets

Tactical Net—The Tactical Net is the front line net employed during an incident, usually used by a single government or disaster services agency to coordinate operations within their designated jurisdiction. There may be several tactical nets in operation for a single incident depending on the volume of traffic and the number of agencies involved. Communications include both point-to-point tactical comms and written traffic handling. If traffic is light resource net business such as recruiting and scheduling can be combined and operated as joint function.

Resource Net—For large-scale incidents, a Resource Net is used to recruit operators and equipment in support of operations on the Tactical Nets. As an incident requires more operators or equipment, the Resource Net evolves as a check-in place for volunteers to register and receive assignments. It can also serve as a travel net that keeps track of deployed assignees.

Command Net—As the size of an incident increases and more jurisdictions become involved in the incident, a Command Net may become essential. This net allows the incident managers to communicate with each other to resolve inter- or intra-agency problems, particularly between cities or within larger jurisdictional areas. It is conceivable that this net could become cluttered with a high volume of traffic. It may also be necessary to create multiple command nets to promote efficiency. For Karo-Echo amateur radio field operations

the command net will be the preferred private channel for the Emergency Coordinator (EC), his/her assistants (AECs), the Net Control Stations, and related staff to plan strategy and staffing.

Open and Directed (Closed) Nets—A net may operate as an open or “free form” net, or as a directed net where a net control station (NCS) is used to control the flow of transmissions on the channel. Typically, when the amount of traffic is low or sporadic, a net control isn’t required and an open net is used. Stations merely listen before they transmit. When a net is declared a “directed” net, then *all* transmissions must be directed by the NCS.

Note: All KARO-ECHO members should train in both directed net procedures and in acting as an NCS in a directed Net.

Our Net(s) operate under the Incident Command System and thus serve the specific agencies under this framework. It is the job of the KARO/ECHO Emergency Coordinator and/or Assistant Emergency Coordinator to establish our directives and communicate such to the NCS stations.

IVb: Incident Command System (ICS)

The Incident Command System (ICS) is a management tool that is being adopted by professional emergency responders throughout the country. ICS provides a coordinated system of command, communications, organization, and accountability in managing emergency events. Amateur Radio operators should be familiar with the system, as well as how they will interface with agencies employing ICS.

Integral to the ICS is the concept of Unified Command. There is only one boss, the Incident Commander, who is responsible for the overall operation. For any incident, a variety of functions must be performed, ranging from planning and logistics to handling the press. The functional requirements of planning, logistics, operations, and finance are always present despite the size of the incident. They may be handled by a single individual for a small incident or a “Command Staff” in a large incident. Another characteristic of ICS is “the span of control.” In simple terms, any manager should only directly manage a small number of people. ICS uses the number of five for organizational purposes. The number five isn’t hard and fast, but it provides a useful organizational guideline. However, in amateur radio operations that number is not of utility.

Amateur Radio volunteers fit into the Incident Command System as communicators. Within the ICS, this would place us in the Logistics Section in the Service Branch as part of the Communications Unit. The Communications Unit provides all communications services for the operation.

To clear up any confusion, **communications** (as logistics under ICS) can and does provide tactical, command, logistics, as well as resource functions within our own radio command system when requested.

FEMA Training courses, IS-100, IS-200, and IS-700 are recommended as part of the FEMA Independent Study Program at training. See fema.gov/EMIweb/IS/
Please be familiar with IC- 213 and IC-214 forms and have them in your go-kit.

V: Use Phonetic Spelling for difficult or unusual Spellings

ITU Phonetic Alphabet adopted by the International Telecommunication Union.

A ALPHA
B BRAVO
C CHARLIE
D DELTA
E ECHO
F FOXTROT
G GOLF
H HOTEL
I INDIA
J JULIET
K KILO
L LIMA
M MIKE
N NOVEMBER
O OSCAR
P PAPA
Q QUEBEC
R ROMEO
S SIERRA
T TANGO
U UNIFORM
V VICTOR
W WHISKEY
X X-RAY
Y YANKEE
Z ZULU

VI: Basic Principles of Operation

VIA: Principles of Repeater Operation

- 1. Use minimum power.** Otherwise, especially in heavily populated areas, you run the risk of keying more than one repeater, thus causing unnecessary interference. Low power also conserves batteries.
- 2. Use simplex, whenever possible.** ARRL recommends 146.52 MHz, but it's a good idea to have at least one other simplex channel available. Use a gain antenna at fixed locations for simplex operation.
- 3. Observe the “pause” procedure between exchanges.** When it is your turn to transmit, after the transmitting station stands by, count to two or three before pressing your transmit switch. This gives others with urgent traffic a chance to check in.
- 4. Listen much, transmit little.** Announce your presence on a repeater when you are certain of being able to assist in an emergency, and don't tie it up with idle chatter.
- 5. Monitor your local EmComm net frequency** when you are not otherwise busy.
- 6. Think before you talk.** Stick to facts, control your emotions. Remember, during an emergency is the time when you are most apt to act and speak rashly. Anyone with an inexpensive public service band receiver can monitor.
- 7. Articulate, don't slur.** Speak close to your mike, but talk across it, not into it. Keep your voice down. In an emergency situation, inexperienced ops may become excited and tend to shout. Talk slowly, calmly—this is the mark of an experienced communicator. Use a headset when possible. If tired, slow down and speak loud enough.

VIb: Universal Principles of Disaster Communication

- 1. Keep transmissions to a minimum.** In a disaster, crucial stations may be weak. All other stations should remain silent unless they are called upon. If you're not sure you should transmit, don't.
- 2. Monitor established disaster frequencies.** Many EmComm localities and some geographical areas have established disaster frequencies where someone is always (or nearly always) monitoring for possible calls.
- 3. Avoid spreading rumors.** During and after a disaster situation, especially on the phone

bands, you may hear almost anything. Unfortunately, much misinformation is transmitted. Rumors are started by expansion, deletion, amplification or modification of words, and by exaggeration or interpretation. All addressed transmissions should be officially authenticated as to their source. These transmissions should be repeated word for word, if at all, and only when specifically authorized.

4. Authenticate all messages. Every message which purports to be of an official nature should be written and signed. Whenever possible, amateurs should avoid initiating disaster or emergency traffic themselves. We do the *communicating*; the agency officials we serve supply the *content* of the communications.

5. Strive for efficiency. Whatever happens in an emergency, you will find hysteria and some amateurs who are activated by the thought that they must be sleepless heroes. Instead of operating your own station full time at the expense of your health and efficiency, it is much better to serve a shift at one of the best-located and best equipped stations, suitable for the work at hand, manned by relief shifts of the best-qualified operators. This reduces interference and secures well-operated stations.

6. Select the mode and band to suit the need. It is a characteristic of all amateurs to believe that their favorite mode and band is superior to all others. The merits of a particular band or mode in a communications emergency should be evaluated impartially with a view to the appropriate use of bands and modes. There is, of course, no alternative to using what happens to be available, but there are ways to optimize available resources.

7. Use all communications channels intelligently. While the prime object of emergency communications is to save lives and property (anything else is incidental), Amateur Radio is a secondary communications means.

Normal channels are primary and should be used if available. Amateurs should be willing and able to use any appropriate emergency channels—Amateur Radio or otherwise—in the interest of getting the message through.

8. NTS (National Traffic System) and Disaster Welfare Inquiries (DWI) coordination. Within the disaster area itself, KARO/ECHO is primarily responsible for emergency communications support. The first priority of those NTS operators who live in or near the disaster area is to make their expertise available to their Emergency Coordinator (EC) where and when needed. For a timely and effective response, this means that NTS operators should coordinate with their ECs before the time of need so that they will know how to best respond.

Please see the appendix on handling Disaster Welfare Inquiries (DWI) traffic giving precedence to **outgoing** disaster messages. (Appendix DWI)

VIc: Operational Procedures

Operations:

Your area incident commander or NCS will assign you to a specific location and tactical identifier). You may also be assigned as a **shadow** to follow around a key personnel member who needs radio communications.

Maximize the most efficient use of the radio spectrum: In general, fewer words are best.

Be succinct, but unambiguous.

Do not sacrifice accuracy for speed.

Use monosyllable equivalents in place of multi-syllable words.

When in doubt and in need to pause let your fingers off the transmit button.

Always use the minimum amount of power necessary for effective comms in order to save battery power and minimize potential interference to nearby operations, but again never sacrifice accuracy for speed. Listen to your voice as you speak.

On written messages always be aware that the receiving operator is writing the text down at approximately 25 words per minute; therefore pace yourself, enunciate clearly, and pause often to check on readability.

Use tactical designators primarily. Example: “EC9 command this is EC9 Triage, over” Block Captain 1 this is EC9 Command”. Note that the station that is being called precedes the call sign/designator of the station calling.

Hams and GMRS licensed operators should identify their stations with their FCC call sign every ten minutes and at the end of a series of transmissions according to FCC rules.

Do not hesitate to break the net with emergency traffic. In the past it has been common to voice, “break break” for emergency traffic to break the net for emergency traffic. Less ambiguous to simply voice:” EMERGENCY” and Net Control will say, “emergency traffic go ahead”. Then state the nature of the traffic and for whom it is for. Emergency traffic is reserved to a life threatening situation, or an impending threatening situation. Similarly, voice “EMERGENCY followed by your callsign/designator”. The NCS will voice, “_____ (callsign) list your traffic.”

Emergency Traffic

Example: “EMERGENCY”

NCS: “Emergency Traffic go ahead and list”

“Net Control this is EC9 Rescue Team 2. I have emergency traffic for EC9 Triage.

NCS: “EC9 Triage, call EC9 Rescue Team 2 here. If good copy receive your traffic here.”

“EC9 Rescue Team2, this is EC9 Triage, how copy?”

Rescue Team2 voices, “EC9 Triage, good copy. Are you ready to copy?.”

EC9 Triage answers: “Ready to Copy”

After the message is received, triage will say, “copy”, “roger”, or “check”.

Both stations will then say: “clear” and sign their FCC call signs.

The above is a procedure when traffic is light. When traffic is heavy, the NCS will direct stations to pass traffic o a different frequency.

After **Emergency traffic** is passed, **Priority traffic** is the second level of importance. Priority traffic is reserved for time-sensitive material; but not in situations that immediately threaten life and safety. Voice **“Priority”** or break for priority traffic followed by your designator/callsign. NCS will direct you.

Example: “Priority EC9 Triage”

NCS: “EC9 Triage list your traffic”

“This is EC9 Triage. We have a general call for more leg splint material and potable water.”

NCS: “Copy, stand by.”

Often a formal written message is not required. General QSTs and point-to-point traffic are handled according to the direction of NCS.

Health and Welfare Traffic is of lower priority; but should be attempted as long as there are operators available, bandwidth, and time. (Details on another appendix)

Routine Traffic is the lowest priority and is handled last.

Always handle priority traffic before routine traffic. Handle Emergency traffic before priority traffic.

Written Messages versus Direct Conversations

Not all traffic needs to be written down. When possible put the two parties involved in direct communication.

Example: Nurse Nancy needs to talk with EC9 triage coordinator via radio.

Nurse Nancy tells a radio operator (her shadow) that she has emergency traffic for EC9 triage coordinator. Nurse Nancy’s radio operator then tells NCS that he has emergency traffic for EC9 triage coordinator. NCS asks the net if anyone is on frequency who can handle the traffic. The EC9 triage coordinator shadow responds as follows: “This is EC9 triage coordinator operator. I can put the EC9 triage coordinator on frequency directly.” NCS says: “Nurse Nancy shadow can you put Nurse Nancy on now directly”? Nurse Nancy answers, “This is Nurse Nancy”. NCS says: “Go ahead with your traffic”.

Then Nurse Nancy and the EC9 triage coordinator can talk back and forth directly until complete. When complete, the radio operator takes back the microphone and says: “Traffic complete”.

Such a direct procedure saves much time when compared with written traffic.
At other times written messages must be used; but should be avoided when possible.

Keep transmissions short. Drop the transmit button every 5 words, or approximately every 10. If the receiving operator is inexperienced, say, “drop” in order to notify the receiver that the drop is intentional. This allows the destination station a window to break in if needed.

When finished with your message say, “end of message”. Indicate “end, no more” or “more follows”.

When a message is received, say “copy”, “roger”, “received”, or “check” (notice that “check” is one syllable).

For a positive response, say “affirmative” or “confirmed”. Use “negative” for no.

Practical Net Operations

Net Control Station (NCS) should always acknowledge a transmitting station by their tactical call sign or ham callsign. Never just say “roger” as there may be more than one station that was transmitting simultaneously.

Example: W6LKE checks into the net. NCS responds, “W6LKE roger” or just “W6LKE”. That is a sufficient confirmation that the NCS recognizes W6LKE.

NCS should always pause for emergency traffic. When in doubt **ALWAYS LET GO OF THE MIC KEY**.

If the net is busy, NCS should move traffic to supplemental simplex frequencies if possible.
Example: “W6LKE establish contact with N6DRT here. If successful move to 146.475 to pass your traffic.”

Then W6LKE calls N6DRT, thusly: “N6DRT from W6LKE 145.475”.

N6DRT responds, “N6DRT going to 146.470”.

Both stations are expected to report back to NCS after traffic is passed, thusly: “W6LKE clear” – “N6DRT clear”, or “W6LKE Back” and/or “N6DRT Back”. etc.

NCS will assume that the traffic was passed successfully unless reported otherwise.

Example:

W6LKE: “W6LKE no go”.

NCS: “W6LKE copy, Standby”.

On the secondary designated frequency (off of the net frequency) the **RECEIVING** station calls to check if the frequency is clear, because a clear frequency is essential for clear

reception. Interference may not be heard by the transmitting station.

Example: “Is this frequency in use?” If the frequency is busy the RECEIVING station notifies the transmitting station to arrange to move to the next clear frequency in the same direction (away from the net) and repeats the sequence on the new frequency; i.e., “Is this frequency in use?”

If clear, the RECEIVING (RX) station will call the transmitting station (TX) and establish contact. Then the RECEIVE station will indicate that it is ready to copy.

Example. W6LKE calls N6DRT, “N6DRT are you ready to copy?”
N6DRT responds: “N6DRT Ready” or “N6DRT Go”

After the completion of traffic return to Net frequency by stating your callsign and the word “back”. Example: “EC9 Block 6, back.” If the NCS is experienced, the returning stations will not have to voice the word, “back”. Success will be assumed, unless the reporting stations indicate a “no go”.

While on the net frequency, the NCS will decide whether the traffic is to be passed on net frequency or on another frequency.

Example, the NCS will say: “W6LKE contact N6DRT HERE and pass your traffic.”

W6LKE will call; “N6DRT from W6LKE, are you ready to copy”?

The RECEIVE station, N6DRT will begin with “ready to copy” or “go”.

The sending station then begins transmission of the first message according to the standard message format rules.

Listen to the NCS in the case that the calling order is reversed. If the TRANSMITTING station is asked to begin the exchange (addressed first), the transmitting station will establish contact and ask:

“N6DRT are you ready to copy?” The reply is “ready to copy”, often shortened to “ready”, or “go ahead”, or “go” (“go” is most succinct).

Use International phonetics to spell out unusual words or names. Say, “I spell”.

Example: “I spell Smythe, Sierra Mike Yankee Tango Hotel Echo”

For **numerals**, say “**FIGURES**” as a proword. Example, “**Figures**” One Two Three Four Fifth Street”

For a series of **letter groups**, example, say “**letter group I spell**” alpha charlie foxtrot “ (written out ACF). The proword, “letter group” warns the destination station that phonetic designators follow.

Example, “letter group, xray yankee zulu (written out XYZ)

Similarly, “**Initials**” is voiced as a proword, before phonetically spelling out initials:
Example: “Initials Juliet Poppa” written as JP and counted as 1 word.

For **mixed groups**, (a mixture of any combination of letters, numerals, or punctuation marks, say “mixed group” (to indicate numbers, letters, or punctuation follows).
Example: “Mixed group Alpha One Bravo Two Romeo Crosshatch One Six” (phonetic spelling is assumed in mixed groups). This is written out as A1B2R#16 and counted as one word.

Use, the prowords “**I say again**” to repeat difficult, unexpected, important, or unusual words or phrases.

Example: Voice, “I say again, “Sir Francis Drake Boulevard” or “I say again, not”

Standard Procedural Words and Phrases

AFFIRMATIVE: Yes.

AFFIRM (said with a long *AA* vowel sound as in yay) is the unambiguous way of stating YES.

WILCO is no longer commonly used as in Will Comply.

Example: “W6LKE will you take over the net at 1400 local time?” W6LKE answers:
“Affirm”

Confirmed: Confirmed is used to confirm a question.

CONFIRM: The request to confirm correct copy of group(s). The affirmative reply to the request.

CONFIRMED: That is correct – confirmed. Example: “Please confirm 1423 Main Street”.
Answer: “Confirmed”

NEGATIVE: No.

OVER End of transmission, invitation to transmit. Substitute **GO AHEAD** or **GO**.

GO AHEAD. Used after requesting fills after interruptions to signal the sending operator to continue. Also used as an equivalent to **OVER** or **CONTINUE**. Use “**GO**” if possible.

OVER:

Indicates the end of your transmission and signals the receiving station to go ahead. Many transmissions by the net control or individual stations are “self-completing”, i.e., the words

themselves signal the end of the sequence. In such cases the “over” may be omitted. Such signals are pointed out throughout the chapter. The “end no more” sequence, for example, is sufficient to signal the end of the transmission of the radiogram. On the other hand, a station’s traffic list, comment, or question is of uncertain length and is terminated with “over”, or sometimes with its call sign.

The “OVER” may be used between messages or after other transmissions whenever the transmitting station wishes to signal or force the other station to go ahead.

The “OVER” is useful in preventing two stations from transmitting at the same time. It is used effectively when the words of the transmission are not themselves a clear indication for the other station to “go ahead”. “Doubling” by two stations can result in much wasted time and copying errors. See also the note on “GO AHEAD” under MISC. below.

ROGER/Copy:

Receiving station acknowledgment of message(s) copied. It is not necessary to repeat message number(s) or other parts.

ROGER, RECEIVED, COPY, or CHECK, are in wide use. For the sake of brevity and efficiency CHECK is the preferred method. CHECK, COPY, or ROGER, meaning the message(s) were received. Roger, COPY, and CHECK means “received and understood”. It does NOT mean “yes”, will comply, or “affirmative”.

SLASH (/) Symbol (SLASH SYMBOL) is sometimes used to separate characters in groups. The "/" may be voiced as, "slash", "stroke", "diagonal", or "slant-bar". Specifically, a forward slash leans forward / and is voiced “forward slash”. When voiced as “slash”. It is assumed to be a forward slash. A backward slash \ **should be** voiced “backward slash” and written \.

The SLASH is also used when the word count (check) in the preamble of ARRL messages is adjusted. (See the appendix C for Advanced message handling and procedures)

Additional Procedures:

SENDING SPEED

SENDING AT THE PROPER SPEED FOR ACCURATE COPY IS OFTEN A HARD SKILL TO LEARN IN TRAFFIC HANDLING! Practice makes perfect.

Clear sending, using introductory and operational words and expected transmission protocols properly, and using proper spacing between groups, are crucial for accuracy. Strive for speed, but never sacrifice accuracy for speed. Remember someone is writing down or typing your words.

Know how to set up a message center, in accordance with the FIFO principle (First In-First Out)

In short, do not allow messages to become stuck at the bottom of a pile and make sure that

all relevant receivers are copied by messages that need to go to more than one destination.

Coordination with local running groups, boy scouts, church groups, bicycling teams, and high school volunteers for adjunctive messenger services.

Develop a staffing schedule for operators on a 24 hour basis.

Test, test, and test – practice and drill

VII -- Glossary and Abbreviations:

Affirm: Affirmative, Yes, Will comply. Also use “Will Co” or “Will do”.

ARES: Amateur Radio Emergency Services sponsored by the ARRL

ARRL: The American Radio Relay League is the national organization for Amateur Radio,

Back: I am back on frequency and in operation, standing by.

CERT: Community Emergency Response Team. There are 11 designated areas in El Cerrito and 6 in Kensington, for a total of 17 CERT Areas.

See EC CERT map: <http://el-cerrito.org/DocumentCenter/View/3358>

Clear: Finished, Also voice “OUT”. Clear and out signify no further traffic.

Confirmed: Signifies: “That is correct”.

Directed Net: The Net Control Station (NCS) is in charge of the operation. For routine or priority traffic, voice break. For emergency traffic say: “break break”. The NCS will say: “station go ahead”. Then identify yourself and list your traffic. The NCS will then give further procedural instructions. For emergency traffic, it is best to say, “EMERGENCY” and then the NCS will recognize you. Use “break” for routine traffic and say, “PRIORITY{, for priority traffic.

Duplex: Operation where the transmitted signal is instantaneously retransmitted on another frequency. Duplex operation is commonly used in repeater operation as well as in cross-band operation.

Simplex: Direct communications where the transmit and receive frequencies are the same.

EOC: Abbreviation Emergency Operations Center located across from main El Cerrito FD

in the Public Safety Building. Each city and county have their own EOCs.

ERP: Effective Radiated Power. Usually calculated by RF output in watts times the gain of the antenna over a theoretical dipole (dBd). EIRP is the effective radiated power using a theoretical isopole (dBi), which is theoretically 2.5 dB less efficient than dBd.

Examples: 5 watts RF output using a dipole antenna would equal 5 Watts ERP.

Using 5 watts RF output a 3 dBd gain antenna, the ERP would be 10 watts.

FRS: Family Radio Service limited to .5 watts on channels 8-15, and 2 watts on ch.1 – 7 and 2 watts on Ch. 16-22. External antennas are not allowed. FRS works well for short distance radio communications within buildings and blocks (line of sight) depending upon terrain.
<https://www.fcc.gov/general/family-radio-service-frs>

GMRS: General Mobile Radio Service uses channels from around 462 MHz to 467 MHz. The most common use of GMRS channels are for short to medium distance two-way communications using hand-held radios similar to walkie-talkies, base stations, and repeaters. A small base station is one that has an option of an outside antenna and can transmits with no more than 5 watts on channels 1-7, .5 Watts on channels 8-15, and 50 watts on the rest of the GMRS frequencies (Ch. 16-22)

<https://www.fcc.gov/general/general-mobile-radio-service-gmrs>

OLD FRS/GMRS Channel nomenclature: Please note that the channel designators for GMRS and FRS changed as of September 1, 2017

For example: channel 7 FRS is the old GMRS channel 15 but the frequency is the same 462.7125 MHz. This information may be useful to avoid confusion for those who have older equipment. In the newer radios channels 1-22 are all shared by both FRS and GMRS. In addition, GMRS has 8 additional channels 23-30 which are repeater 5 MHz offsets up from channels 15-22.

GMRS and FRS Dual Service Radios

Many manufacturers have in the past received approval to market radios that are certified for use in both GMRS and FRS. Other manufacturers have received approval of their radios under the GMRS rules, but market them as FRS/GMRS radios on the basis that some channels are authorized for both services, or a user of the device may communicate with stations in the other service.

Radios marketed as "FRS/GMRS" or "dual-service radios" are available from many manufacturers and many retail or discount stores. The manual that comes with the radio, or the label placed on it by the manufacturer, should indicate the service the radio is certified for. If you cannot determine what service the radio may be used in, contact the manufacturer. If you operate a radio under the GMRS rules, you must have a GMRS license. GMRS radios generally transmit at higher power levels. In GMRS 5 watts is typical on channels 1-7, 1/2

watt on ch. 8-15, and 5-50 watts on the other GMRS channels). GMRS only radios may have detachable antennas as compared to FRS radios with non-detachable antennas. Hence, GMRS will increase the range of your communications considerably.

For FRS, you are not required to have a license, if you operate a radio that has been approved for FRS and restrict operations exclusively to the FRS channels with a maximum power of 2 watts of effective radiated power and with an integral antenna Exception: Channels 8-15 are restricted to .5 watts)

Ham: A FCC-licensed amateur radio operator capable of high power and long-distance communications.

ICP: Incident Command Post

ICS: Incident Command System. Used for interoperability to integrate diverse disaster services agencies under a single command (Incident Commander – IC).

IC: Incident Commander. One who is in command of the Operation. Perhaps it wise to use Block Commander, and Area Commander for block and area commanders respectively..

KHz: Kilohertz. A frequency abbreviation for one thousand Hertz (cycles per second)

Nets by Type

Logistics Net: A net dealing with the procurement, maintenance, and transportation of material, facilities, staffing, and scheduling personnel during a disaster.

Tactical Net—The Tactical Net is the front line net employed during an incident, usually used by a single government or disaster services agency to coordinate operations within their designated jurisdiction. There may be several tactical nets in operation for a single incident depending on the volume of traffic and number of agencies involved. Communications include both point to point tactical comms and written traffic handling. If traffic is light resource net business such as recruiting and scheduling can be combined and operated as joint function.

Resource Net—For large-scale incidents, a Resource Net is used to recruit operators and equipment in support of operations on the Tactical Nets. As an incident requires more operators or equipment, the Resource Net evolves as a check-in place for volunteers to register and receive assignments. It can also serve as a travel net that keeps track of deployed assignees.

Command Net—As the size of an incident increases and more jurisdictions become involved in the incident, a Command Net may become essential. This net allows the incident managers to communicate with each other to resolve inter- or intra-agency problems,

particularly between cities or within larger jurisdictional areas. It is conceivable that this net could become cluttered with a high volume of traffic. It may also be necessary to create multiple command nets to promote efficiency. For Karo-Echo amateur radio field operations the command net will be the preferred private channel for the Emergency Coordinator (EC), his/her assistants (AECs), the Net Control Stations, and related staff to plan strategy and staffing.

Open and Directed (Closed) Nets—A net may operate as an open or “free form” net, or as a directed net where a net control station (NCS) is used to control the flow of transmissions on the channel. Typically, when the amount of traffic is low or sporadic, a net control isn’t required and an open net is used. Stations merely listen before they transmit. When a net is declared a “directed” net, then *all* transmissions must be directed by the NCS.

Note: All KARO-ECHO members should train in both directed net procedures and in acting as a NCS in a directed Net.

MHz: Abbreviation for Megahertz a frequency measurement equal to one million Hertz (cycles per second).

NCS: Net Control Station

Offset: Used by repeaters to demarcate the transmit offset frequency which is either up or down from the receive frequency. Generally the offsets for 2m operation are + or - 600 Hz. For UHF and GMRS (70cm) the offset is generally + 5 MHz.

OES: Office of Emergency Services often located at the State and county EOCs

OVER: Go ahead or simply voice, “go”

PL Tone: Acronym for **P**rivate **L**ine (usually CTSS or DCS). These are sub-audible tones sent on transmit used to access/activate repeaters or switches.

Precedences:

ARRL Message Precedences

EMERGENCY—Any message having life and death urgency to any person or group of persons, that is transmitted by Amateur Radio in the absence of regular commercial facilities. This includes official messages of welfare agencies during emergencies requesting supplies, materials or instructions vital to relief efforts for the stricken populace in emergency areas. On CW and digital modes, this designation will always be spelled out. When in doubt, do not use this designation.

PRIORITY—Abbreviated as P on CW and digital modes. This classification is for important messages having a specific time limit, official messages not covered in the

emergency category, press dispatches and emergency-related traffic not of the utmost urgency.

WELFARE— Abbreviated as W on CW and digital modes. This classification refers to an inquiry about the health and welfare of an individual in the disaster area, or to an advisory from the disaster area that indicates all is well. Welfare traffic is handled only after all Emergency and Priority traffic is cleared. The American Red Cross equivalent to an incoming Welfare message is DWI (Disaster Welfare Inquiry).

ROUTINE— Abbreviated as R on CW and digital modes. Most traffic in normal times will bear this designation. In disaster situations, traffic labeled Routine should be handled last, or not at all when circuits are busy with higher-precedence traffic.

RACES: Radio Amateur Civil Emergency Service sponsored by the FCC but now superseded by the Auxilliary Communications Service (ACS). In California, State ACS is the Radio Amateur Civil Emergency Service (RACES) unit for the State of California, which encourages participation and cooperation with (and between) other Emergency Communications (EMCOMM) units statewide, including (but not limited to) City and County RACES units, the Amateur Radio Emergency Service (ARES), The Military Auxiliary Radio System (MARS) and the American Red Cross (ARC).

Roger: Message received. Or say, “check”, “understood”, or “copy”

SAR: Search and Rescue

Triage areas: Locations used to evaluate medial casualties and/or to perform temporary emergency medical treatment if required.

PAGE BREAK

SECTION VIII -- *ADVANCED* DETAILS ON EFFICIENT MESSAGE HANDLING PROCEDURES

Feel Free to Skip this Section until you become familiar with all other sections.

Formal Written Message Handling

Not all traffic on disaster nets need to be written. For example, checking into or out of a net, establishing radio contact, notifications to change frequencies, radio checks, and many other communications are not required to be written or even logged. Often it is most efficient when shadowing a disaster official to establish contact with her/his correspondent and give him/her the microphone to transact directly.

There are two standard written formal message handling formats commonly in use.

1. The ICS form 213. This form lends itself to in-house memo type communication.
2. The American Radio Relay League (ARRL)/ARES message (radiogram) format. This form lends itself to radio field communications operation and is used in KARO-ECHO as well as in ARES.

The FEMA Incident Command Structure (ICS) uses the standard ICS 213 format. Formal written communications to or from the EOC (Emergency Operations Center) and/or the Incident Command Centers (ICC) should us ICS 213 format.

If a message is going outside of the disaster area via an amateur radio network, use the ARRL format. These formats will be detailed in subsequent appendices.

Getting Fills: WA (word after), WB (word before), AB (All Before), AA (All After), CFM (confirm), BN (all between)

Often it is necessary to **fill** in a missing letter, word, or phrase. For efficiency's sake, please use the following introductory words (also called prowords). The major **FILL** prowords are Word After, Word Before, All After, All Before, All Between, Confirm/Confirmed.

Say, "word after xxxx" to request the sending station to resend the word after xxxx.
Say, "word before xxxx" in order to request the sending station to resend the word before xxxx.

Say, "all after xxxx" to request the sending station to resend all words after xxxx.
Say, "all before xxxx" to request the sending station to resend all words before xxxx.
Say, "all between xxxx and yyyy" to request the sending station to resend all the words between xxxx and yyyy. Transmitting station will repeat "xxxx" followed by the filled in words and end with "yyyy".

When asking for a confirmation say, "please confirm xyz abc" in order to confirm unusual or unclear texts, numbers, or words, example "xyz abc". If correct, the sender will say; "confirmed". If incorrect, the sender will repeat the word immediately before or after the requested confirmation and then follow with the correct spelling or word.

Example: "Please confirm figures 2987 Arlington". Answer; "Confirmed". Example: "Please confirm 2187 Arlington". Answer "Negative, figures 2987 Arlington"

MORE ON PRO-WORDS, OPERATIONAL WORDS, or so-called INTRODUCTORY WORDS

These words are spoken to begin or end the message, indicate information for the receiving operator within the message, or to separate parts of the message. They are not written down in the message itself or counted as part of the word count (the check). They are merely clarifying operating aids that are usually spoken in a different tone of voice to distinguish them from written parts of the message also

called INTRODUCTIONS that precede written words, numerals, or mixed groups, or other sections of text.

INTRODUCTORY WORDS FOR GROUPS

Introductory words (also known as prowords) are spoken to alert the receiving operator to a special type of group to follow such as **initial(s)**, **figure(s)**, **mixed group(s)**, **amateur call sign**, **I spell**, **I say again** (used for unusual, unexpected, or difficult words or groupings.)

The introducer (proword) implies that the group is going to be sent one character at a time, letters phonetically if present. The proword avoids having to try to accurately pronounce such groups and then use “I spell” to spell them phonetically. They are used ahead of single groups.

INTRODUCING MULTIPLE TEXT GROUPS: Only one proword is used per group. The prowords (introductory words) are voiced by the sender, but not written down by the receiver. They are usually spoken in a different tone of voice.

Voice the introductory word(s) ahead of the message group. Voice the group as individual letters, figures, or punctuation as indicated; then go on to the next group. ALWAYS voice the letters in introduced groups with PHONETICS unless indicated otherwise in this manual. Do not use multiple introducers within a single group is the general rule.

The **exception** is a special case when repeating as when voicing “I say again”. For example, normally, in using “I say again” simply repeat the last correctly sent word or phrase. However, if it was originally sent phonetically, and you need to repeat it to correct it, only then, spell it again phonetically. Example: “I say again (pause) I spell, Sierra Mike Yankee Tango Hotel Echo” (written as Smythe).

Examples will follow.

General RULES FOR VOICING MESSAGES: Following are the guidelines for voicing parts of the message during transmission.

SPELLING, PHONETIC or LETTER When voicing a group try to understand the perception of the group by the receiving operator. Although context sometimes helps in group perception, surprises in formatting often make it safer to treat each group individually when making the decision to spell. When there is any chance of misunderstanding or ambiguity you may spell the group. Voice the group, use the operational prowords “I spell” immediately, then spell the group **with phonetics**. When done go on to the next group. Spell only one group at a time using the operational words “**I spell**”. Use only standard phonetics. Over-use of phonetics is

controversial, but the objective in traffic handling is absolute accuracy in copy. Based on errors measured in the traffic system, the following guidelines target the most frequent and critical errors.

ALWAYS SPELL THE FOLLOWING GROUPS USING PHONETICS: (unless unambiguous/common spelling can be assumed)

- 1) Last names of addressee in address.
- 2) Proper names in text if unusual;
- 3) Initials;
- 4) Last names in signature unless unambiguous;
- 5) Unusual or difficult spellings
- 6) Mixed groups (consisting of letters and numerals)
- 7) Last names in Op Notes (see special appendix C for special handling instructions)

Example: “JOHN SMYTHE, I SPELL SIERRA MIKE YANKEE TANGO HOTEL ECHO, SMYTHE”, written out as John SMYTHE. Example: “Initials, Juliet Romeo”, written out as, JR.

REPEATING difficult, unusual, or unexpected words or groups twice: Say the word or group as intended, but then voice, “**I say again**”, repeat the word(s), and then continue. It is wise to limit repeats for clarity to one group at a time to avoid confusion. In marginal radio conditions, however, repeating phrases or whole lines of a message can increase the chance for correct copy. When voicing “I say again” the operator has a choice depending on conditions to spell with or without phonetics. Using phonetics is most accurate, but most time-consuming. It is best to simply repeat the word or phrase as it was originally sent, by using “I say again”.

If you need to use phonetics, instead use the introductory term, “**I spell**” instead of using “I say again”. Attempt to avoid repeating words if possible.

Example: “WHISKER, **I spell**, (pause) WHISKEY HOTEL INDIA SIERRA KILO ECHO ROMEO”. Example: “I spell, Mike Alpha India November Echo”.

The proword “I spell”, signals that what immediately follows will be **phonetically** spelled out using the **International Telecommunications Union, (ITU) radio phonetic alphabet also known as the NATO Phonetic Alphabet and the ICAO Phonetic Alphabet**.

Hint: When using “I say again” repeat the word or phrase the exact same way it was sent the first time. If it was sent originally with phonetics then repeat it with phonetics. If it was sent without phonetics, then repeat it without phonetics. The proword phrase, “I say again”, is synonymous with “I repeat”. Use sparingly when emphasizing unusual unexpected, or difficult phrases and words.

Also use “**I SAY AGAIN**”, (use as above) To **CORRECT AN ERROR**. If you made an error in transmission, use “I SAY AGAIN” “I say again”, go back to last group word that was sent correctly, and repeat it followed by the correction, followed with the last word received correctly, or group that was received correctly.

If the sending station made an error while transmitting he/she says, "I say again" and goes back to the last word or group that was sent correctly, resends it correctly, and ends with the last word or group that was originally sent correctly. In this case, phonetic spelling is NOT necessary depending on the situation. Example: "please send ---- splints to triage area" is corrected by voicing; "Error, I say again, please send bandages and splints to triage area"

FIGURE(s) or NUMERAL(s) are two prowords equal to the same thing

Use "figures" as the proword used to introduce a group of one or more numbers. Similarly the proword, NUMERAL(S) is used identically in place of "FIGURE(S)". Some stakeholders use "Figures" and others "Numerals" to alert the receiving station that numbers will immediately follow.

Say "figures (or numerals)", then voice the numbers one digit at a time (pause after each group of numbers). Then go on to the next word or group.

Examples: numeral 2, is voiced as "figure TWO"; 62 is voiced as "figures SIX TWO". They are counted as one word. Saying "figure TWO" means the numeral "2". Saying "TWO" and spelling it out phonetically, unmistakably implies the spelled-out word and it is written out as TWO. Voicing "figures SIX TWO" indicates the single group "62" written out as 62 and counted as one word. Saying "figure SIX... figure "TWO" results in copy of "6" and "2" as two separate numbers and counted as two separate words. Voicing, "SIXTY TWO" without the proword, figures, implies writing out long hand as "sixty two". These are then counted as two separate words (sixty and two) spelled out exactly as shown. Warning never voice "sixty two" for a number group written as "62". If sixty two is written out in the message, the sending station voices: "I spell" sierra india xray tango yankee, I spell) tango whiskey oscar" end of letter group.

Saying, "Figures Six Two Three Figures One seven three" is written out as 623 173 and counted as two separate words or groups 1 group = 1 word in the word count/check) when checking the word count. Here, "figures" alerts the receiving station that a number group follows, while the second voiced figures represents a second number group that follows. Avoid the use of "figures SEVENTEEN" in place of "figures ONE SEVEN". Use "figures One Seven" for 17; or "figures FIVE TWO" for 52 (not fifty two), etc. Figures are numerals, not letter groups.

Definitely avoid the "teens" (fifteen, sixteen, thirteen, etc.) and the "y's (fifty, ninety, eighty, etc.) can cause errors under difficult receiving conditions. Operators should expect a single numeral or group of numerals following the proword, "figures". However, if the originator spells out seventeen in the original message, then send it as originated; e.g. "I spell, sierra echo victor echo november tango echo echo november".

This applies to the non-introduced figures in the Preamble and other non-introduced numerals and numeral groups as well. "SEVENTEEN" is not the correct pronunciation for any of the single numerals or numeral groups; rather in that case say, "figures 1 7". Example: the time date can be sent, "time figures 1930". Always try to use numerals 0-9 exclusively unless the numbers are written out in the text.

Voicing “figures” where the message number, word count, time, date address and telephone numbers, and zip codes are anticipated can be treated as already introduced unless there are exceptional circumstances (see below). No proword, (“figures”) are needed when such numerals are customarily anticipated. Example: On the line normally used for time and date simply voice: “zero eight one five June one two” Written out as 0815 June 12 or more simply sent as 0 8 1 5 June 1 2. If the time is in UTC, the convention is to add a Z at the end to indicate ZULU time; which means UTC Example, written out as: “0815z June 12”. In local disaster traffic, the time is assumed to be local and the year is not necessary.

TELEPHONE FIGURES

Optionally voice “**telephone figures**” to introduce the telephone numbers in an address or signature when no zip code is present (thus forcing the receiving station to skip the zip and go directly to the telephone number line).

Example: EL CERRITO CALIFORNIA (no zip) 510 555 5555, voiced as “EL CERRITO CALIFORNIA telephone figures FIVE ONE ZERO (pause) FIVE FIVE FIVE (pause) FIVE FIVE FIVE FIVE. Note the words, “telephone figures”, are voiced, but not written down.

When the zipcode is present, the telephone numerals are anticipated to follow, and thus there is no need to voice “telephone figures” as a proword. In that case, simply follow the zipcode by voicing “FIVE ONE ZERO (pause) FIVE FIVE FIVE (pause) FIVE FIVE FIVE FIVE if one is sending to an experienced operator.

Example: “El Cerrito California nine four five three zero “FIVE ONE ZERO (pause) FIVE FIVE FIVE (pause) FIVE FIVE FIVE FIVE written out as, “El Cerrito CA 94530 510 555 5555

INITIAL

Used to introduce a **single letter initial**. **Phonetic** pronunciation is mandatory, as in the single initial in a proper name. Example: John R Smith: "JOHN (pause) "initial ROMEO (pause) SMITH". Note the proword “initial” is always followed using phonetics, just as “I Spell” is always followed with phonetics.

Similarly, “A”, or **any other single letter**, as a group in the text or name initial are treated the same. Examples “initial ALPHA” is written as A. The pronoun “I” is voiced, “initial INDIA” and written as I.

INITIALS (LETTER GROUP); Used for abbreviations, acronyms, initials, etc.

Treated and sent as a word group for a single letter. Some ops the proword, “LETTER GROUP” or proword “INITIALS” interchangeably for two or more letters/initials. as in an abbreviation, unpronounceable group, etc. Phonetics are mandatory; as in:

AM is voiced as “initials ALPHA MIKE”. FM voiced as “initials FOXTROT MIKE”, ICS is voiced as “initials India Charlie Sierra”, NTS voiced as “initials NOVEMBER TANGO SIERRA”, THURS voiced as “initials TANGO HOTEL UNIFORM ROMEO SIERRA”

This is an unnecessary proword, but you may come across it often. It is superfluous because the sending station could just as well voice, “**I spell**”, alerting the receiving station that phonetically spelled out letters follow.

INTRODUCING MULTIPLE TEXT GROUPS

Only one introducer is used per group. The proword is not written. They are usually spoken in a different tone of voice. Do not use multiple introducers within a single group.

Say the introductory word(s) ahead of the group, voice the group as individual characters (letters, numerals, or punctuations) as indicated, then go on to the next group remembering that all letters and punctuation are spelled out phonetically.

ALWAYS voice the letters in introduced groups with PHONETICS unless indicated otherwise below. For example, the proword, "I Spell" assumes that phonetic spelling follows. Example: "I Spell, Juliet Oscar November". Written out as JON

MIXED GROUP

A proword used to introduce a group consisting of a mix of 2 or more of the 3 types of characters (letters, numbers, and/or punctuation) permitted in a group. Examples: R2, A3J, A/X, MS/4, W4XYZ/3, etc. Voiced respectively, "Mixed group Romeo two", "mixed group alpha three Juliet", mixed group Alpha slash Xray", "mixed group Mike Sierra slash four", "mixed group Whiskey four xray yankee zulu slash three". Note a forward slash is assumed. If a backward slash \ is meant voice "backward slash". Voice "Decimal" for period or dot, voice comma for ",", and the like. In summary, the proword, Mixed Group" prepares the receiving operator to expect phonetically spelled letters, punctuation, and/or numerals. If needed to avoid ambiguity, one may close the mixed group by voicing "end of mixed group".

PLEASE NOTE THAT ALL LETTERS IN MIXED GROUPS ARE AUTOMATICALLY SPELLED OUT PHONETICALLY.

SLASH (/) Symbol (SLASH SYMBOL) is sometimes used to separate characters in groups.. The "/" may be voiced as, "slash", "stroke", "diagonal", or "slant-bar". The SLASH is also used when the word count (check) in the preamble of ARRL messages is adjusted. (see the appendix C for Advanced message handling and procedures)

The "/" may be voiced as "slash", "stroke", "diagonal", or "slant-bar" ("Forward slash" is not necessary and should be avoided.). Voicing "Backward slash", is used only for a backward slash.

MIXED GROUP BEGINNING WITH FIGURE(s)

This paragraph is somewhat redundant, but distinguishes between mixed groups that start with figures as opposed to previously mixed groups that begin with letters. Used to introduce a mixed group as above when the first character is a numeral, as in: 2A: voiced as: "mixed group figure TWO ALPHA". 2/A is voiced as "mixed group figure TWO SLASH ALPHA With two or more numbers beginning the group: 24/B is similarly voiced as "mixed group figures TWO FOUR SLASH BRAVO".

Here, we can question the usage of the proword, "figures" after "mixed group". Although some ops believe that is helpful, avoid it as superfluous. To simplify, if you have a mixed

group to send simply say, "mixed group" and phonetic spelling will be assumed for the letters and punctuation; while all numbers that are voiced will be assumed to be numerals. When finished with the mixed group and another mixed group follows, proceed to voice again, "mixed group" and proceed as above. Only when the end of the mixed group is followed by a duplicitous character that is also used in the ITU phonetic alphabet, is it necessary to say, "End of mixed group". As an example a person's name, Mike, might follow a mixed group. The receiver will not know that "Mike" is not part of the mixed group and to be written as the letter "M" unless they are told the endpoint of the mixed group. Alternately, before Mike is sent, send it phonetically voiced "I Spell Mike India Kilo Echo".

In days of old, R was used in place of the decimal. 146.67 MHz was voiced as "mixed group figures ONE FOUR SIX ROMEO SIX SEVEN letter group Mike Hotel Zulu". Please note that "R" has conventionally been voiced in place of a decimal point within mixed figure groups; however in today's modern usage, where modern radio operators are not seasoned, it is much better to use the proword, "decimal". Example: "mixed group figures ONE FOUR SIX Decimal SIX SEVEN letter group Mike Hotel Zulu" This note is added for those who may receive a message in what is in the archaic form of using R voiced ROMEO) in place of a decimal.

Notice above that MHz was sent with the proword "letter group". Is that superfluous? What if the sender sent, "I spell, Mike Hotel Zulu" The result is the same.

AMATEUR CALLSIGN

Used to introduce an amateur call sign in the Address, Text, or Signature (but not in the Preamble). Phonetics are mandatory for the letters. Example: KO0O: voiced as "amateur call KILO OSCAR ZERO OSCAR", or it could just as well be voiced simply as "mixed group kilo oscar zero oscar".

Note that call sign groups with slashes appending other information are introduced and voiced as a mixed group and spelled phonetically. Example: W6LKE/MM is voiced "mixed group, WHISKEY SIX LIMA KILO ECHO SLASH MIKE MIKE (pause)

SUMMARY

MANDATORY USE OF PHONETICS AND SPELLING

INTRODUCED GROUPS (I spell, letter groups, mixed groups, initials, figures, and ham callsigns are all examples of introductory words (prowords).

All characters in introduced groups are voiced one character and/or numeral at a time All letters in introduced groups are voiced with phonetics: Initial, Initials (letter groups consisting of two or more letters forming the group). The only exception is the proword, I say again, which is the standard pro-phrase for "I repeat". "I say again" is also used to correct a previously sent error. It is normally NOT sent phonetically. Only if the error was sent phonetically, then use "I say again" followed by the correct word or spelling sent phonetically.

The initial "X" has conventionally been used as a pause – a placeholder for a period or other separators such as commas, colons, semi-colons, dash, etc, voiced as “ X-RAY”. XRAY is written as an X and counted as one word.

Voice, “QUERY” in place of an exclamation mark. Query is counted as one word; but can be written as a question mark.

SPELL THE FOLLOWING TYPE GROUPS (USING PHONETICS) by voicing, “I Spell”

(In Preamble):

- City of origin, unless very common and understood;

(In Address, Signature, and/or Operator note):

- First and last names, unless unique and understood without ambiguity;
- Street names, unless very common and understood;
- City name, unless very common and understood;

(In Text)

- Unusual or difficult words; and plurals (as needed to emphasize the “s”);
- Words with numerous or ambiguous spellings (to, too, two, for, four);
- Words that might appear out of context;
- Spelled-out numbers (Note that the use of the proword, “figures” denotes that numerals will follow. These are written as numbers. However spelled-out numbers are voiced, “SIX, I spell Sierra India Xray...” (“eighth” and “eight” are also candidates for spelling out, and so are fifteen, sixteen, etc. It is best practice is to avoid spelling out number groups. Instead say “figures one five” instead of fifteen. Say “figure 5 0 (zero) instead of fifty, etc., if appropriate.

(In Signature and Op Notes):

- First names and address names in signature, unless unique or very common and understood.
- WHEN THERE IS ANY DOUBT ABOUT CORRECT COPY, SPELL IT OUT PHONETICALLY!

The use of the introductory words (prowords) completes the “tool kit” for voicing any type of group encountered in the message. All groups are either plain text words to transmit, and perhaps be spelled using “I spell”, and these eligible groups to be introduced.

ELIMINATE EXTRANEous WORDS

Prowords, Introductory Words, and Operational words (prosigns) are set aside for special purposes and are recognized by experienced traffic handlers. Avoid unnecessary or superfluous words which may cause confusion. Eliminate words such as "today's date", "BACK STOP, that's two words", "GOLD as in sunset", and similar descriptors. Avoid voicing any extraneous words like, "city of origin", "to", "going to", "street address", "break for text", "break it for the signature", "signature", etc. unless the receiving operator is just

learning. Assume that the receiving operator is experienced and efficient, as band use efficiency is important in emergency situations.

In other words, the proper use of pauses, prowords, operational words and rules for voicing each individual group of the properly formatted message is sufficient and expected practice for proper perception and copy by the receiving operator. The object is to have the receiving operator copy the message exactly as it is written on the sending copy. Avoid surprises. Treat the unusual by spelling it out phonetically with the proword “I Spell”; or repeat it twice with prowords, “I say again” (for clarity).

Extraordinary Prowords

EMAIL, PACKET, and INTERNET ADDRESSES The normal voicing of such addresses is to treat all the groups formatted in the address as individual groups using the previously described introducers and phonetics as required.

These addresses may be introduced/voiced with the prowords “email address”, “packet address” and “internet address” when it is desired to avoid having to introduce every group within the address. See the voicing rules for examples. In this case, these words are used as introducers.

For **email addresses** send or say “AT” for the “@” sign. Send or say “Decimal” for the “dot” sign or period. Example: Maxim@ARRL.NET is voiced, “Mike Alpha Xray India Mike at Alpha Romeo Romeo Lima decimal net”.

URLs and File Names: Forward slash / is voiced “forward slash”. Backward slash \ is voiced “Backward Slash”. Where forward or backward are not germane, simply voice slash or slash-bar.

Packet and internet addresses may appear complex; but if one follows the above rules, the message will get through accurately.

Passwords and serial numbers may need to be differentiated by lower and/or upper cases. When you hear “**lowercase**” or “**uppercase**” it is to be applied to the immediately following letter. If another uppercase letter is to follow immediately use the proword “uppercase” again.

The prowords uppercase or lowercase only apply to the immediately following case sensitive letter. If uppercase or lowercase is not voiced for the next letter then it is assumed to be not case sensitive.

Introductory words (prowords) are used for all eligible groups in the message **except** where there are special relaxed rules for the Preamble and Telephone numbers in the Address and Signature where the experienced operator expects the types of groups to be sent.

The above relates to accuracy and speed proceeding in order from the easiest routine encounters to the more difficult occurrences.

Appendix A

Assignment Locations

El Cerrito

El Cerrito EOC

Antenna, radio, and emergency power

KARO-ECHO Coordinator:

ON Site Contact/Coordinator:

Fire Station 71

Antenna, radio, and emergency power

KARO-ECHO Coordinator:

ON Site Contact/Coordinator:

Fire Station 72

Antenna, Radio, and Emergency power

KARO-ECHO Coordinator:

On Site Contact/Coordinator:

Harding Clubhouse

Radio, DC Power supply, and antenna, no emergency power

KARO-ECHO Coordinator: KE6BEE

On Site Coordinator:

Tassajara Park Clubhouse

Radio, DC Power Supply and Antenna on Recreation Building Park

KARO-ECHO Coordinator: KM6CXI

On Site Contact Coordinator:

Kensington

Fire Station 65 (KPSB)

Antenna, radio, and emergency power

KARO-ECHO Coordinator: Marian Gade, KC6OBK

ON Site Contact/Coordinator

Kensington Community Center (KCC)

Antenna, radio, and emergency power

KARO-ECHO Coordinator: Marian Gade, KC6OBK

ON Site Contact/Coordinator

Kensington Hilltop School (KHS)

Antenna, radio, and emergency battery power

KARO-ECHO Coordinator: Marian Gade, KC6OBK

ON Site Contact/Coordinator

There are two KARO-ECHO radios in private locations in Kensington that need to be placed

Address Locations

Emergency Operations Center (EOC)

The EOC is located in the El Cerrito Public Safety Building at 109000 San Pablo Ave, El Cerrito, CA 94530

KARO-ECHO Coordinator:

ON Site Contact/Coordinator:

Station 71

Station 71 is located at 10900 San Pablo Avenue at the corner of Manila Avenue. The station was built in 1964 and is the headquarters for both the Fire Department and the El Cerrito Police Department. In addition to the Fire Department's administration, Station 71 is also home to Engine 71, Truck 71, and OES #300.

Station 72

Station 72, located at 1520 Arlington Boulevard, was built in 1997 to replace the outdated station at this same site. This station serves as a secondary Emergency Operations Center for the City and has a training room facility as well as archive storage for Fire Department records. Engine 72 and Engine 372 are both housed at this facility as well as a 16-foot mass casualty incident trailer that stores extra medical supplies for large-scale incidents.

Station 65

Station 65 is located at 217 Arlington Avenue in Kensington, was built in 1970 to replace the old station that was located down the street. The Station is owned by the Kensington Fire Protection District that has contracted with the El Cerrito Fire Department to provide personnel and administrative services since 1995. In addition, the Fire District leases part of the building to the Kensington Police Department who also work out of this same facility. Engine 65 and Engine 365 are both housed at this facility.

Emergency Assignment Go-Kit (Jumpkit) Checklist (Appendix B)

Background:

In most cases, all that is necessary in order to provide disaster communications may be as simple as a vhf/uhf handheld radio, a rubber duck antenna, and a few extra battery packs. However, in a disaster when disaster communications are most needed, please consider that the repeaters may be down, one may be stationed inside a concrete or steel building, and there may be no AC power readily available to recharge batteries.

In such circumstances better portable antennas and more extensive power capabilities may be invaluable; hence, a customized “Go-Kit Checklist.

General Considerations:

The contents of the go-kit or jumpkit depends on where one is going, for how long, and what is to be expected. Crucial, besides the radios, are spare batteries as the #1 consideration. Second in importance is a portable antenna (anything is better than a rubber duck). This may be all one needs “normally”.

However, when a Disaster hits and power, telephone, cable, internet, and cell phones fail, it is too late to attempt to remember in detail in order to assemble an adequate go-kit. It is extremely helpful to have a personalized checklist handy and pre-bagged essential items (a go-kit).

Go-kits should be customized according to the climate, location of the assignment, the nature of the assignment, and probable duration. Again, especially important are a flashlight, fully charged spare battery packs, spare alkaline batteries and packs, and an external antenna. An external antenna (a gain mag mount, a portable J Pole, a portable full wave loop, etc.) will make it possible to operate inside steel concrete buildings with a hand held, where the rubber duck antenna may not be adequate.

Portable mag mount antennas with a metal ground plane (cookie sheet, sheet metal, or pizza pan) are easy and adequate. Antenna connectors, cables, and adapters for UHF cable (PI259/SO239). Caution: Do not use an SMA to UHF adapter directly on your HT as it will create extra torque and possibly weaken or break your HT's antenna connection. A list should include customized operating aids and personal items

An efficient method is to have four separate bags that all fit inside a single larger knapsack. This makes it far easier to find needed items efficiently. A fifth item would be a cardboard or plastic container to put larger items (coax patch cords, cabling, ground planes, masts, HF

equipment, transmission lines, antennas, and similar).

Bag 1 (the power bag):

Power connections with Anderson power pole 12 vdc cables and connectors for all rigs and accessories including bare ends with wire nuts so that transitional splices into other systems can be accomplished. Two or more Spare charged battery packs for one or two dual-band HTs including alkaline battery packs and alkaline batteries. Car chargers and car power adapters for the HTs. It is recommended that all vehicles have not less than a half tank of gas; and the vehicle has a AGM heavy duty marine/car battery with double lugged Anderson power pole cables attached.

Bag 2 (the antenna bag): This bag has all kinds of adapters for sma male, sma female, uhf (double female/double male), bnc, and N connectors so that interface with existing antennas at the assignment site can be made. A twinlead J pole roll up portable antenna, a full wave 2-meter delta loop made from rg-58 that is hangable on a wall or suspended from a non-metallic hook or rack, an extended ½ wave or 5/8 wave rubber duckling, a homemade 1/4 wave 2M antenna that connects directly on top of the HT, a gain mag mount antenna (5/8 wavelength or collinear) and a 2' X 2' sheet metal plate for a ground plane (cookie sheets and pizza pans can also serve the same purpose for the mag mount). 30' of rg8x coax with male UHF connectors on both ends and barrel connectors or similar.

Bag 3 (miscellaneous operating essentials): Bag three contains the customized go-kit checklist, a clipboard, paper, forms, EMcomm frequency list, repeater list, a copy of the 2m and 70cm band plans, print outs of all memories programmed into the HTs, cheat sheets for the rigs, licenses/credentials, operating aids, cash, glasses, cell phone, cell phone car charger, pens, paper, sharpies, LED flash light and/or lantern (with spare batteries), speaker mics, headsets, assorted spare fuses,

Bag 4 (personal items): Magnifying glass, glasses/contact lens, raingear, sunscreen, plastic cup, water bottle(s), toothpaste, tooth brush, towel, disinfectants, spare socks, change of clothes, Swiss army knife, plastic fork/knife/spoon, can/bottle opener, duct tape, etc.

Similarly, appropriate boots (steel toed best), gloves, sleeping bag, folding chair, folding table, headlight (miners light), hard hat, medicines, prescriptions, first aid kit, battery powered am/fm radio, tools, toilet paper, and other such accoutrements can also be considered depending.

Special considerations (not baggable): HF rig and antennas, deep cycle battery and cables, HF antennas, antenna tuner, key/keyer, paddle, mast and mast clamps, computer capable of running off of 12vdc, TNC (packet cabling) or substitute SignalinkUsb/Rigblaster (or equivalent) soundcard radio interface with cables, etc. Bulky items can be placed in a rain tight plastic container (or cardboard box).

Follows is a sample Checklist. Please customize to your own personal requirements

Legend:

X = Required (must have in kit at all times)

R = Recommended (likely useful on many assignments)

O = Optional (useful on some assignments)

2-8 Hour Carry Kit

Purpose: To be kept nearby at all times for immediate (within minutes) communication of damage reports during Resource Net Level 1 ops. Also used to remain in contact with Resource Net Level 2 while returning home to retrieve 12-hour Go-Kit.

Items:

X	2m/70cm dual-band radio <ul style="list-style-type: none">• HT recommended (min. 5W on 12V/2.5W on batt)• Mobile 25W optional (if vehicle will not be far away)• Programmed with Resource Net frequencies
X	Charged batteries for 2-3 hours operation
X	2m/70cm dual-band mobile antenna (mag mount, window mount or existing mobile antenna)
X	Current Voice Frequency List
X	Modified Mercalli (Mike-Mike) scale (1-10)
X	Notepad / pens / pencil
R	Cigarette lighter adapter to radios, phone, powerpole
R	Emergency county and city telephone contact list
R	Cell phone
R	Water (16 oz.)

8--12 Hour Go Kit

Purpose: For fully independent operation; unknown environment (heat, cold, wind, rain); unknown time (day, night, up to 12 hours). Return home to retrieve.

Equipment

Portable Radio Equipment:

X	2m/70cm dual-band handle-talkie (HT) <ul style="list-style-type: none">• Minimum 5W on 12V/2.5W on batteries [Note 1]• Dual-receive recommended
X	Radio user manual or cheat sheet
X	Earbud or headphones minimum; headset, earbud/mic, or speaker/mic/earbud, or similar recommended

X	Charged batteries for 12 hours (min. 3000 mAh) [Note 2]
X	Power cord adapters – connect HT to power sources: <ul style="list-style-type: none"> • Powerpoles • Cigarette lighter socket • Vehicle battery terminals
X X	Spare fuses Adapters for mini plugs, RCA plugs, 1/4" / 1/8" phone-jack combinations, etc.
X	Coax adapter: connect HT to coax
X	Min. 40 feet of 50 Ohm coaxial cable
R	Small backpack, vest, chest harness or other similar method for carrying HT while operating portable
Mobile or Stationary Radio Equipment:	
R	2m/70cm mobile radio (separate/removable from vehicle) <ul style="list-style-type: none"> • 25W minimum • Dual-receive, cross-band repeat
R	Radio user manual or cheat sheet
R	Headset (stereo recommended for VFO per ear) w/ inline, handswitch or footswitch PTT
R R R	Battery for 12-hours operation (20 Ah min.; 26 Ah rec.) Hf-6M portable/mobile gear with antennas and coax Deep cycle AGM battery or Gel Cell
R	Power cord adapters – connect mobile to power sources: <ul style="list-style-type: none"> • Powerpoles and breakout box • Cigarette lighter socket • Vehicle battery terminals
R	PowerPole splitter or fused distribution panel
R	Spare fuses
R	Coax adapter: connect mobile radio to coax
R	Min. 40 add'l feet of 50 Ohm coaxial cable w/barrel conn.
R	Extension cord, 3-wire, 3-6 ft., multi-outlet
O	Extension cord, 3-wire, 50-100 ft.
Antennas:	
X	Coax adapters: connect coax to existing antenna jack: <ul style="list-style-type: none"> • BNC plug (male) & BNC socket (female) • UHF plug (PL-259) & UHF socket (SO-239) • N-type plug (male) and N-type socket (female)

X	2m/70cm dual-band magnetic or window mount antenna
R	2m/70cm high gain HT antenna
R	2m/70cm dual-band portable base antenna (e.g. roll-up J-pole or other)
R	Portable mast (elevates antenna base min. 10 ft.)
R	Tripod or other self-supporting base for mast
R	Window clip antenna mount (for non-metallic vehicles)
Packet Equipment:	
O	Laptop with Outpost and PacFORMS installed
O	USB flash drive (i.e. USB key)
O	TNC (may be hardware, software or built into radio)
O	Cables: TNC to radio; TNC to PC
O	Shade cover for display
O	Portable printer
O	Entire station can operate for min. 1 hr on battery
Other Communications Gear:	
R	Cell phone & charger and/or cigarette lighter adapt.
O	FRS/GMRS Radio and Spare Alkaline Batteries
O	Satellite phone
O	VHF / UHF Scanner with battery power supply or programmed SDR
Tools:	
R	Duct tape or Gaffers tape
R	Electrical tape
R	Nylon Tie-Wraps/wire ties
R	Utility knife
R	Small multi-tool or tool kit
O	Volt-Ohm meter
O	SWR/Power meter/Antenna analyzer
O	Solder station with solder
Operating Position:	
X	Sign(s) for operating position
R	Lighting for operating position
R	Rope or Dacron cord (50')
R	Folding chair
O	Magnetic sign for car
O	Folding table
O	Pop-up Canopy
O	Tarp (8' by 8' or larger)
O	Safety strobes or flares
O	Caution/flagging tape (to mark cables, guy ropes, ...)
O	Safety cones (to mark cable, tripod, ...)

Documentation	
Identification:	
X	CA Driver's license or CA-issued ID card
X	Amateur Radio license
X	County Emergency Responder ID card or MAC badge
X	If issued: ID badge, city badge, MAC Qual card
Maps:	
X	Paper or offline maps covering all Kensington and El Cerrito [Note 3]
X	Compass or GPS
R	Maps & addresses of antenna locations (if available)
R	City, county or other detail maps
Forms and Documentation:	
X	Modified Mercalli (Mike-Mike) scale (1-10) 1 is lowest
X	ICS 205 – Communications Plan (min. 5)
X	ICS 211A – Communications Check-In (min. 5)
X	ICS 213 -- Message (min. 10)
X	ICS 214 -- Unit Activity Log (min. 5)
X	ICS 309 – Communications Log (min. 5)
X	ICS 314 – Windshield Survey (min. 5)
X	Phone message pad (2-part style recommended)
R	County Performance Standards (Required for MACs)
Logging / Note taking:	
X	Clipboard (covered type recommended)
X	Notepads (standard or waterproof)
X	At least 2 pens / pencils
O	Highlighters / felt-tip pens
Contact Lists:	
X	Voice and Packet Frequency Lists
X	DEC/ADEC/EC and city EC telephone contact list
X	Police/Fire direct dial phone numbers
O	Repeater directory
Personal Gear	
Vehicle:	
X	Reliable operating condition
X	Fueled – minimum ½ full at all times
O	Jumper cables, tow bar, winch, chains, flare/torch
General Items:	
X	Money (paper and coin) – in case ATMs are down
X	Watch or clock
R	Trash bags

Personal Safety Gear:	
X	Flashlight or headlamp and spare batteries for 12 hours
X	Safety vest, ANSI standard (lime yellow recommended)
R	First Aid kit
R	Whistle
R	Work gloves
R	Sunglasses
R	Sunscreen lotion
R	Insect Repellent
R	Safety glasses
R	Mask (NIOSH-certified N95 or better)
O	Hearing protection (e.g. foam ear plugs)
O	Hard hat (lime yellow recommended)
O	Chemical light sticks
Clothing:	
X	Sturdy, closed-toe shoes (no sandals)
X	Long pants (no shorts)
X	Hat (broad brim recommended)
X	Seasonal jacket / rain gear
Food & Water:	
X	Food for 12 hours (make your own list)
X	Water for 12 hours (3-4 quarts recommended)
R	Small cooler or ice chest
O	Can opener, utensils, bowl
Toiletries and Personal Items:	
R	Hand soap and/or sanitizer
R	Toilet paper
O	Antacid tablets
O	Prescription medication
O	List of medication used
O	Eyeglasses, contact lens & spare. Magnifying lens
Miscellaneous	
O	Portable AM/FM radio, TV, and spare batteries
O	Binoculars
O	Baggies to seal/protect items
O	Short shovel or sturdy trowel

Extended Go-Kit

Purpose: Additional items for fully independent operation over an extended period of time.
Used in situations where returning home after shift is not possible or not ideal.

As Needed or Required

Power Source:

-	Regulated DC power supply
-	Battery charger
-	Spare batteries (for charging while operating)
-	12 VDC -to- 120 VAC Power Inverter
-	Solar power system (microcrystalline with charger)
-	Portable generator and fuel (propane preferred)
Clothing:	
-	Rain gear
-	Jacket
-	Warm clothing (preferably in layers)
-	Under garments (3 sets)
-	Socks (3 sets)
-	Pants (3)
-	Belt
-	Shirts (3)
-	Alternate boots or enclosed shoes (steel toed preferred)
-	Sleepwear
-	Cold water laundry soap
Food and Water:	
-	MREs (self-heating) or other non-perishable meals
-	Water (1 gal/day recommended, depending on conditions)
-	Water purification tablets or devices
-	Can opener
-	Cooler or ice chest
-	Thermos
-	Coffee cup
Shower Items:	
-	Washcloth and towel
-	Soap and shampoo
-	Razor and shaving cream
-	Toothbrush and toothpaste
-	Comb and/or brush
-	Deodorant/antiperspirant
-	Wash basin (in case of no sink)
Shelter:	
-	Sleeping pad
-	Sleeping bag/blanket
-	Pillow
-	Blanket
-	Foldup cot
-	Tent

Notes:

The above check lists identify items that will, or might, be useful to an ARES-RACES or MUT volunteer when they are deployed. It should be clear that some items from each list would be needed in just about any deployment and that others wouldn't be essential. Since each volunteer must determine which items to include in their personal jumpkit to bring on any one deployment, these lists should only be used as a guideline or starting point.

- Most recently manufactured hand-held radios ARE capable of 5W output when 12-13.8 VDC is connected to the DC-IN jack and at least 2.5W output power using rechargeable battery packs. Check your radio's user manual to be sure your radio outputs at least 2.5W on rechargeable batteries. However, most hand-held radios are NOT capable of producing a minimum of 2.5W output power using AA batteries. Some known exceptions are the Kenwood TH-D7 and the Yaesu FT-60. For all other radios, rechargeable battery packs will be needed unless the radio can be shown to have a minimum of 2.5W output on AA batteries (check user manual or test with power meter).
- A review of the most popular handheld radios was conducted. Receive current, transmit current and rechargeable battery pack capacity were reviewed. 3000 mAh was determined to be the minimum capacity needed for 12 hours of operation (for example two packs with 1500 mAh batteries each, while some radios may require a little more). Depending on the make and model, this translates to 2 or 3 rechargeable battery packs. This minimum requirement correlates well with real-world experience in drills and real incidents such as Hurricane Katrina.
- **Background:**

About the Deployment Jumpkit Checklist

In most cases, all that is necessary in order to provide disaster communications may be as simple as a vhf/uhf handheld radio, a rubber duck antenna, and a few extra battery packs. However, in a disaster when disaster communications are most needed, please consider that the repeaters may be down, one may be stationed inside a concrete or steel building, and there may be no AC power readily available to recharge batteries. In such circumstances better portable antennas and more extensive power capabilities may be invaluable; hence, a customized "Go-Kit Checklist".

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The contents of the go-kit or jumpkit depends on where one is going, for how long, and what is to be expected. Crucial, besides the radios, are spare batteries as the #1 consideration. Second in importance is a portable antenna (anything is better than a rubber duck). This may be all one needs "normally".

However, when a Disaster hits and power, telephone, cable, internet, and cell phones fails, it is too late to attempt to remember in detail in order to assemble an adequate go-kit. It is extremely helpful to have a personalized checklist handy and pre-bagged essential items (a go-kit).

Go-kits should be customized according to the climate, location of the assignment, the nature of the assignment, and probable duration. Again, especially important are a flashlight, fully charged spare battery packs, spare alkaline batteries and packs, and an eternal antenna. An external antenna (a gain mag mount, a portable J Pole, a portable full wave loop, etc.) will make it possible to operate inside steel concrete buildings with a hand held, where the rubber duck antenna may not be adequate.

Portable mag mount antennas with a metal ground plane (cookie sheet, sheet metal, or pizza pan) are easy and adequate. Antenna connectors, cables, and adapters for UHF cable (PI259/SO239). Caution: Do not use an SMA to UHF adapter directly on your HT as it will create extra torque and possibly weaken or break your HT's antenna connection. A list should include customized operating aids and personal items

An efficient method is to have four separate bags that all fit inside a single larger knapsack. This makes it far easier to find needed items efficiently. A fifth item would be a cardboard or plastic container to put larger items (coax patch cords, cabling, ground planes, masts, HF equipment, transmission lines, antennas, and similar).

Bag 1 (the power bag):

Power connections with Anderson power pole 12 vdc cables and connectors for all rigs and accessories including bare ends with wire nuts so that transitional splices into other systems can be accomplished. Two or more Spare charged battery packs for one or two dual-band HTs including alkaline battery packs and alkaline batteries. Car chargers and car power adapters for the HTs. It is recommended that all vehicles have not less than a half tank of gas; and the vehicle has a AGM heavy duty marine/car battery with double lugged Anderson power pole cables attached.

Bag 2 (the antenna bag):

This bag has all kinds of adapters for sma male, sma female, uhf (double female/double male), bnc, and N connectors so that interface with existing antennas at the assignment site can be made such as a twinlead J pole roll up portable antenna, a full wave 2 meter delta loop made from rg-58 that is hangable on a wall or suspended from a non-metallic hook or rack, an extended ½ wave or 5/8 wave rubber duckling, a homemade 1/4 wave 2M antenna that connects directly on top of the HT, a gain mag mount antenna (5/8 wavelength or collinear) and a 2' X 2' sheet metal plate for a ground plane (oven pans, cookie sheets, and pizza pans can also serve the same purpose for the mag mount). 40' of rg8x coax with male UHF connectors on both ends and barrel connectors or similar.

Bag 3 (miscellaneous operating essentials):

Bag three contains the customized go-kit checklist, a clipboard, paper, forms, EMcomm frequency list, repeater list, a copy of the 2m and 70cm band plans, print outs of all memories programmed into the HTs, cheat sheets for the rigs, licenses/credentials, operating aids, cash, glasses, cell phone, cell phone car charger, pens, paper, sharpies, LED flash light and/or lantern (with spare batteries), speaker mics, headsets, assorted spare fuses.

Bag 4 (personal items):

Magnifying glass, glasses/contact lens, raingear, sunscreen, plastic cup, water bottle(s), toothpaste, tooth brush, towel, disinfectants, spare socks, change of clothes, Swiss army knife, plastic fork/knife/spoon, can/

bottle opener, duct tape, etc. Similarly, appropriate boots (steel toed best), gloves, sleeping bag, folding chair, folding table, headlight (miners light), hard hat, medicines, prescriptions, first aid kit, battery powered am/fm radio, tools, toilet paper, and other such accoutrements can also be considered depending.

Special considerations (not baggable):

HF rig and antennas, deep cycle battery and cables, HF antennas, antenna tuner, key/keyer, paddle, mast and mast clamps, computer capable of running off of 12vdc, TNC (packet cabling) or substitute SignalinkUsb/Rigblaster (or equivalent) soundcard radio interface with cables, etc. Bulky items can be placed in a rain tight plastic container (or cardboard box).

Acknowledgement and thanks to the Santa Clara Valley Ares-Races Group and to the QST article Appearing in QST Vol. LXVI No.7 - July 1982 on pages 79 – 80 for the bare bones and format of this checklist.

Note: This document was heavily derived from an article written by Donald Simon, NI6A, published in QST Vol. LXVI No.7 - July 1982 on pages 79 - 80.

Credit is also due to Niagra ARES who edited the original 1982 "QST" article.

NI6A, is a former West Contra Costa County AEC, former Section Traffic Manager of the East Bay Section, Former Communications Committee Chair of the Disaster Services Committee of the Berkeley/Richmond Red Cross and the East Bay Chapter of ARC, former assistant net manager of RN6, former Assistant Director of ARRL Pacific Division, former TCC PAN, TCC CAN, BPL, a founding member of PACNET, and has served on numerous disaster assignments.

RADIO

EMERGENCY

COMMUNICATIONS

**KENSINGTON - EL CERRITO
AMATEUR RADIO**

**COMMUNICATIONS
CENTER
HERE**

Appendix C

Media Kit (Appendix MK)

Never disclose personal information as to victims, addresses, phone numbers, amount casualties to the media without directives from the ICS.

Fill out this form and give it to Media & Reporters. Refer them to your PIO for more info.

The _____ Kensington Amateur Radio Operator/El Cerrito Ham Operator (KARO/ECHO) Emergency Services has been activated to assist with primary/auxilliary emergency communications for this event. The group is coordinated by

_____ (name of EC).

_____ KARO/ECHO is working with the _____ county/city/town Office of Emergency Management and the following agency(ies):

The group is providing communications links between:

Amateur Radio operators are stationed at the following locations to provide communications assistance:

_____(#) of Amateur Radio operators are at the sites

_____(#) of additional Amateur Radio operators are on standby for additional communications needs.

For more information contact

_____ (name of PIO or ARES leader)
_____ (e-mail)
_____ (phone and pager numbers)
_____ (current location if known)

Appendix MK

Appendix PP

Common Power Connectors

An increasing number of groups have adopted the 30-A Anderson PowerPole connector. Not only can the PowerPole handle greater current, it is also capable of being plugged and unplugged many hundreds of times (operations) without deterioration. These connectors are available from several *QST* advertisers including Cable X-Perts (www.cablexperts.com) and PowerWerx (www.powerwerx.com). More information is available from the Anderson Power Products Web site at www.andersonpower.com. Look for these part numbers:

30 A Complete Connector Housing Contact Retaining Pin

Black 1330G4 1327G6 1331 110G16

Red 1330 1327 1331 110G16

Appendix pp
appendix MAT

Mutual Assistance Teams (MAT)

MAT Concept Summary

It should be noted that there is a fine balance of authority over a deployed ARES MAT. The in-disaster SEC (or delegated authority) should be able to make decisions as to use and deployment of an incoming team.

Therefore, an incoming team should be prepared to submit themselves to such authority; this is evidenced by the fact that any team, internal or external, has only a limited view of the overall operation. The supervising authorities will naturally have a better overview of the whole situation.

In turn, however, the in-disaster authority should be discouraged from abusing the resources of incoming teams. Should a team no longer be required, or a situation de-escalate, the team should be released at the earliest possible time, so that they may return home to their own lives.

The MAT tool should be one of “last resort—better than nothing.” Whenever possible, amateurs from the affected section should be used for support. It is a lot to ask of a volunteer to travel far from home, family and job for extended periods of arduous and potentially dangerous work.

MAT members should be highly trained and certified by the KARO/ECHO EC according to their abilities.

Mutual Assistance Team (MAT) Concept

The MAT concept recognizes that a neighboring section’s KARO/ECHO resources can be quickly overwhelmed in a large-scale disaster. ARES members in the affected areas may be preoccupied with mitigation of their own personal situations and therefore not be able to respond in local ARES operations. Accordingly, communications support must come from

EmComm personnel outside the affected areas. This is when help may be requested from neighboring sections' MAT teams. The following is a checklist of functions for KARO/ECHO MAT leaders. We will use ECEO as the acronym for our Emergency Communication Expert Operators.

Pre-Departure Functions

- Notification of activation/assignment
- Credentials issued
- General and technical briefing
- Review host SEC's invitation
- Transportation
- Accommodations
- Expected length of deployment reviewed

In-Travel Functions

- Review situation status, and sitreps
- Review job assignments
- Checklists
- Affected area profile
- Mission disaster relief plan
- Maps
- Technical documents
- Contact lists
- Tactical operation procedures

Arrival Functions

- Check in with requesting officials
- Obtain information:
 - Ascertain Frequencies in use
 - Current actions (ascertain briefing)
 - Available personnel
 - Communication and computer equipment
 - Support facilities
 - Review Host's Comm plan
- Establish initial intra-team communication net
- Establish HF or VHF channel back to the home section for morale traffic

In-situ Functions

- Initial assessment

- Monitor host ARES officials' communications
- Reduce duplication of effort
- Proper safety practices
- Daily critique of effectiveness

Pre-Demobilization and Demobilization Functions

- Extraction procedure negotiated
- Demobilization plan in effect
- Team critique begun

KARO/ECHO MAT Member Qualifications

- High performance standards
- Specific Qualifications
- Experience
- Team player
- Strong personal desire (Commitment)
- Strong **interpersonal** communication skills
- Emergency management knowledge
- Respected by officials and peers
- Available with consent of employer
- Physically fit

Appendix E MAT

Appendix DWI

Disaster Welfare Message Form

Message Number

Precedence

HX

Station of Origin

Word Count (Check)

Place of Origin

Time Filed and Date (use local time and date)

TO: Name

Address

City, State, Zip

Telephone

Email

Break

TEXT

ARL ONE Everyone safe here. Please don't worry.

ARL TWO Coming home as soon as possible.

ARL THREE Am in _____ hospital. Receiving excellent care and recovering fine.

ARL FOUR Only slight property damage here. Do not be concerned about disaster reports.

ARL FIVE Am moving to new location. Send no further mail or communications. Will inform you of

new address when relocated.

ARL SIX Will contact you as soon as possible.

ARL SIXTY FOUR Arrived safely at _____

Signature

End of Message

Write down the Callsign of station sent to, the Time, and Date

ARRL Message Form Instructions

Every formal radiogram message originated and handled should contain the following four main components in the order given. The numbers and letters refer to corresponding information on the example message on the next page.

1. Preamble

The Preamble includes information used to prioritize and track the message and ensure its accuracy.

(A) Number. Assigned by the Station of Origin and never changed. Begin with 1 each month or year.

(B) Precedence. Determines the order in which traffic is passed. Assign each message a Precedence of

R (Routine), W (Welfare), P (Priority) or EMERGENCY. See the guidelines below in this manual. Note use **W** for disaster welfare messages.

(C) Handling Instructions (HX). Optional, used only if a specific need is present. Handling Instructions are detailed later in this manual.

(D) Station of Origin. The call sign of the station originating (creating) the message.

(E) Check. The number of words or word groups in the text of the message. A word group is any group of one or more consecutive characters with no interrupting spaces.

(F) Place of Origin. The location (city and state) of the party for whom the message was created, and not necessarily the location of the Station of Origin.

(G) Time Field. Optional, used only when the filing time has some importance relative to the Precedence, Handling Instructions or Text.

(H) Date. The date the message was filed. (If Time Filed is used, date and time must agree.) Use local time and date.

2. Address

Name, address, city, state, ZIP and telephone number of the intended recipient, as complete as possible.

Note that punctuation is not used in the Address section.

3. Text

The message information, limited to 25 words or less if possible. Normal punctuation characters are not used in the text. A question mark is sent as QUERY, while DASH is sent for a hyphen. The letter X is used as a period (but never after the last group of the text) and counts as a word when figuring the Check. The letter R is used in place of a decimal in mixed figure groups (example: 146R52 for 146.52).

4. Signature

The name of the party for whom the message was originated. May include additional information such as Amateur Radio call sign, title, address, phone number and so on.

Message Example

1. Preamble 1 W HXG W1AW 16 NEWINGTON CT 1830Z JULY 1
(A) (B) (C) (D) (E) (F) (G) (H)

2. Address

DONALD SMITH
164 EAST SIXTH AVE
NORTH RIVER CITY MO 00789
555 1234

3. Text Family is safe X Am at Uncle Bernies X Will contact as soon as power returns

4. Signature DIANA

ARRL Message Precedences

EMERGENCY—Any message having life and death urgency to any person or group of persons, that is transmitted by Amateur Radio in the absence of regular commercial facilities. This includes official messages of welfare agencies during emergencies requesting supplies, materials or instructions vital to relief efforts for the stricken populace in emergency areas. On CW and digital modes, this designation will always be spelled out. When in doubt, do not use this designation.

PRIORITY—Abbreviated as P on CW and digital modes. This classification is for important messages having a specific time limit, official messages not covered in the emergency category, press dispatches and emergency-related traffic not of the utmost urgency.

WELFARE—Abbreviated as W on CW and digital modes. This classification refers to an inquiry about the health and welfare of an individual in the disaster area, or to an advisory

from the disaster area that indicates all is well. Welfare traffic is handled only after all Emergency and Priority traffic is cleared. The American Red Cross equivalent to an incoming Welfare message is DWI (Disaster Welfare Inquiry).

ROUTINE— Abbreviated as R on CW and digital modes. Most traffic in normal times will bear this designation. In disaster situations, traffic labeled Routine should be handled last, or not at all when circuits are busy with higher-precedence traffic.

ARRL Message Handling Instructions

Handling instructions (HX) convey special instructions to operators handling and delivering the message. The instruction is inserted in the message Preamble between the Precedence and the Station of Origin. Its use is optional with the originating stations, but once inserted it is mandatory with all relaying stations.

PROSIGN INSTRUCTIONS (OPTIONAL)

HXA (Followed by number.) Collect landline delivery authorized by addressee within _____ miles.

(If no number, authorization is unlimited.)

HXB (Followed by number.) Cancel message if not delivered within _____ hours of filing time; service originating station.

HXC Report date and time of delivery (TOD) to originating station.

HXD Report to originating station the identity of station from which received, plus date and time. Report identity of station to which relayed, plus date and time, or if delivered report date, time and method of delivery. (used for tracing)

HXE Delivering station get reply from addressee, originate message back.

HXF (Followed by number.) Hold delivery until _____ (date).

HXG Delivery by mail or landline toll call not required. If toll or other expense involved, cancel message and service originating station.

ARRL Numbered Radiograms for Possible “Relief Emergency Use”

Numbered radiograms are an efficient way to convey common messages. The letters ARL are inserted in the Preamble in the Check and in the text before spelled out numbers, which represent texts from this list. Note that some ARL texts include insertion of information.

Example: NR 1 W W1AW ARL 4 NEWINGTON CT DEC 25 DONALD R SMITH 164 EAST SIXTH AVE NORTH RIVER CITY MO PHONE 733 3968 BT ARL ONE ARL TWO BT DIANA

ARL ONE Everyone safe here. Please don't worry.

ARL TWO Coming home as soon as possible.

ARL THREE Am in _____ hospital. Receiving excellent care and recovering fine.

ARL FOUR Only slight property damage here. Do not be concerned about disaster reports.

ARL FIVE Am moving to new location. Send no further mail or communication.
Will inform you of new address when relocated.

ARL SIX Will contact you as soon as possible.

ARL SEVEN Please reply by Amateur Radio through the amateur delivering this message.
This is a free public service.

ARL EIGHT Need additional _____ mobile or portable equipment for immediate
emergency use.

ARL NINE Additional _____ radio operators needed to assist with emergency at this
location.

ARL TEN Please contact _____. Advise to standby and provide further emergency
information, instructions or assistance.

ARL ELEVEN Establish Amateur Radio emergency communications with _____ on
_____ MHz.

ARL TWELVE Anxious to hear from you. No word in some time. Please contact me as
soon as possible.

ARL THIRTEEN Medical emergency situation exists here.

ARL FOURTEEN Situation here becoming critical. Losses and damage from _____
increasing.

ARL FIFTEEN Please advise your condition and what help is needed.

ARL SIXTEEN Property damage very severe In this area.

ARL SEVENTEEN REACT communications services also available. Establish REACT
communication with
_____ on channel _____.

ARL EIGHTEEN Please contact me as soon as possible at _____.

ARL NINETEEN Request health and welfare report on _____(name, address, phone).

ARL TWENTY Temporarily stranded. Will need some assistance. Please contact me at
_____.

TWENTY ONE Search and Rescue assistance is needed by local authorities here. Advise
availability.

ARL TWENTY TWO Need accurate information on the extent and type of conditions now
existing at your location. Please furnish this information and reply without delay.

ARL TWENTY THREE Report at once the accessibility and best way to reach your
location.

ARL TWENTY FOUR Evacuation of residents from this area urgently needed. Advise
plans for help.

ARL TWENTY FIVE Furnish as soon as possible the weather conditions at your location.

ARL TWENTY SIX Help and care for evacuation of sick and injured from this location
needed at once.

Appendix DWI

7. Prepared By (Name, Call Sign, ICS Position)	8. Date & Time Prepared	9. Page __ of __

Unit Log (ICS Form 214-SCCo ARES/RACES)

Purpose: The Unit Log records details of unit activity, including team activity or individual activity (a unit of one). These logs provide the basic reference from which to extract information for inclusion in any after-action report.

Preparation: The Unit Log is initiated and maintained by the unit leader or the individual (for a single person unit). Completed logs are submitted to the supervisor who forwards them to the Documentation unit.

Distribution: The Documentation Unit maintains a file of all Unit Logs. All completed original forms MUST be forwarded to the Documentation Unit.

Instructions for completing the form:

Field #	Field Title	Instructions
---------	-------------	--------------

1	Incident Name / Number	Enter the name of the event or incident and the activation number assigned to the incident
2	Operational Period	Enter the time interval for which this form applies. Record the start and end date and time.
3	Unit Name	<p>For individuals: Enter your tactical call (e.g. Checkpoint 3, Rover 1, County EOC, etc.) or position name</p> <p>For teams: Enter the name of the organization unit or tactical call sign or resource designator</p>
4	Unit Leader	<p>For individuals: Enter your name and call sign</p> <p>For teams: Enter the name, call sign and ICS position of the individual in charge of the unit.</p>
5	Personnel Roster	<p>For individuals: Leave blank</p> <p>For teams: List the name, call sign, ICS position and home base/city of each member assigned to the unit during the operation period.</p>

6	Activity Log	<p>Time: Enter the local time 24-hour format</p> <p>Activity: Briefly describe each significant activity or event (e.g. task assignments, task completions, injuries, difficulties encountered, etc.).</p> <p>Occasional message traffic can be logged here. For more than occasional traffic, use a 309.</p>
7	Prepared By	Enter the name, call sign and ICS position of the person completing the log.
8	Date & Time Prepared	Enter the date and time the form was prepared (24-hour clock)
9	Page Numbers	Enter the page number and total pages.

Submit this form to your supervisor at the end of your shift.

GENERAL MESSAGE		
TO:	POSITION:	
FROM:	POSITION:	
SUBJECT:	DATE:	TIME:
MESSAGE:		
SIGNATURE:	POSITION:	
REPLY:		
DATE:	TIME:	SIGNATURE/POSITION:

GENERAL MESSAGE		
TO:	POSITION:	
FROM:	POSITION:	
SUBJECT:	DATE:	TIME:
MESSAGE:		
SIGNATURE:		POSITION:
REPLY:		
DATE:	TIME:	SIGNATURE/POSITION:

ICS 213

Communications Log (ICS Form 309-KARO-ECHO)

Purpose: The Comm Log records the details of message traffic and is used by either an individual or a Net Control Operator (NCO). These logs provide the basic reference from which to extract communications traffic history.

Preparation: The Comm Log is initiated and maintained by the Net Control Operator (NCO) or the individual operator (e.g. a field communicator). Completed logs are submitted to the supervisor who forwards them to the Documentation Unit.

Distribution: The Documentation Unit maintains a file of all Comm Logs. All completed original forms MUST be forwarded to the Documentation Unit.

Instructions for completing the form:

Field #	Field Title	Instructions
1	Incident Name / Number	Enter the name and activation number assigned to the incident
2	Operational Period	Enter the time interval for which the form applies. Record the start and end date and time
3	Net / Position Name	<p>For NCOs: Enter the name of the radio net</p> <p>For Others: Enter the name of the position or tactical call</p>

4	Radio Operator	Enter the name and call sign of the radio operator
5	Communications Log	Time: Enter the local time in 24-hour format From: Enter the <i>From</i> call sign or ID and the message number To: Enter the <i>To</i> call sign or ID and the message number Message: Enter the message
6	Prepared By	Enter the name and call sign of the person completing the log
7	Date & Time Prepared	Enter the date and time the form was prepared (24-hour clock)
8	Page numbers	Enter the page number and number of pages

Submit this form to your supervisor at the end of your shift.

KARO-ECHO ON-SITE Assignment Sheet

Site Location _____ Page ____ of ____

Event _____ Activation #: _____ Date: _____
Staging Coordinator Call Sign: _____

12								
13								
14								
15								
16								

**Resource Check
In & Assignment
Sheet**

**KE Resource Net
Tracking**

**ICS 311 Karo/
Echo**

Page ____ of _____

Event _____ Activation #: _____ Date: _____
Net Control Call Sign: _____

	Call Sign	Name	Departure Location	Destination	Assignment Date/Time	Dispatch Check-in	Dispatch Check Out	DEMO B Return Check-in	DEMO B Return Check-out
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									

NAME _____ Date: _____ -

Event/Incident: _____

Karo Echo Windshield Damage Assessment

Windshield Damage Assessment Survey			
REFERENCE		In this area indicate the area or Grid that was assigned Thomas Bros page & Grid or GPS or Other description as provided	
Ref.	Category	Subcategory -- Wind or Earthquake	Subcategory -- Water Damage or Flooding
1.1	Fire - Burning	Fire, any situation	
1.2	Fire - Out	Fire, extinguished	
1.3	Hazard - Gas Leak	Smell of Gas	
1.4	Hazard - Water (H ₂ O) Leak	Water Main Broken, House Main Broken	
1.5	Hazard - Electrical	Down Wires or Power Lines	
1.6	Hazard - Chemical	Sewer Leaks or any chemical spill	
2.1	Structure - Affected	Superficial Damage; Broken Windows; Cracked or fallen plaster; Main damage is to contents	
2.2	Structure - Minor	One (1) wall damaged; Roof missing or damaged. Repairable	Utilities flooded; piers/foundation shifted; Water touched or soaked at the bottom boards, but did not enter the primary living area.
2.3	Structure - Major	Substantial Structural Damage to Walls, Roof, Foundation, etc. Repairable	Water soaked bottom boards and the primary living area. 2 to 5 feet of water in first floor Piers/Foundation washed out or away
2.4	Structure - Destroyed	Partial or full collapse; Building or Mobile Home is off foundation,	Greater than 5' of water on first floor, Not on its piers or foundation, mobile home has bent or twisted frame;
4.1	Roads - Damage	Obstructions	

4.2	Roads - No Access	Roads blocked, sink holes or torn up; Bridge down, cracked, or impassable	
5.1	Loose Animals	Large animals Horses, Cattle, Dogs, Snakes etc.	
	NOTES	Additional comments about the area	

NCS LOG for Callsign: Tactical Callsign: Location:
Date ____ Net Freq ____ Incident ____ Resource ____ Tactical ____
Logistics____

(use a pencil or eraser when stations leave net frequency and return)

Tactical I FCC I Location I Traffic List & precedences) I
Frequency I QRT
Callsign I Callsign I I (OK to use multiple lines) I
I

A handwriting practice sheet featuring ten rows of horizontal lines for practicing the uppercase letter 'I'. Each row consists of three lines: a top line, a middle line, and a bottom line. The letter 'I' is written in black ink on each line, demonstrating its height and placement. The rows are evenly spaced vertically across the page.

2017 FRS/GMRS Channels

- 2017 FCC rule changes FCC-17-57A1.pdf

Channel	Frequency	FRS Power	FRS Bandwidth	GMRS Power	GMRS Bandwidth	Notes/Usage
01	462.5625	2 W	12.5 kHz	5 W	25 kHz	(1) Unofficial national calling channel
02	462.5875	2 W	12.5 kHz	5 W	25 kHz	(1)
03	462.6125	2 W	12.5 kHz	5 W	25 kHz	(1)
04	462.6375	2 W	12.5 kHz	5 W	25 kHz	(1)
05	462.6625	2 W	12.5 kHz	5 W	25 kHz	(1)
06	462.6875	2 W	12.5 kHz	5 W	25 kHz	(1)
07	462.7125	2 W	12.5 kHz	5 W	25 kHz	(1)
08	467.5625	0.5 W	12.5 kHz	0.5 W	12.5 kHz	(1)
09	467.5875	0.5 W	12.5 kHz	0.5 W	12.5 kHz	(1)
10	467.6125	0.5 W	12.5 kHz	0.5 W	12.5 kHz	(1)
11	467.6375	0.5 W	12.5 kHz	0.5 W	12.5 kHz	(1)
12	467.6625	0.5 W	12.5 kHz	0.5 W	12.5 kHz	(1)
13	467.6875	0.5 W	12.5 kHz	0.5 W	12.5 kHz	(1)
14	467.7125	0.5 W	12.5 kHz	0.5 W	12.5 kHz	(1)
15	462.5500	2 W	12.5 kHz	50 W	25 kHz	(2)
16	462.5750	2 W	12.5 kHz	50 W	25 kHz	(2)
17	462.6000	2 W	12.5 kHz	50 W	25 kHz	(2)
18	462.6250	2 W	12.5 kHz	50 W	25 kHz	(2)
19	462.6500	2 W	12.5 kHz	50 W	25 kHz	(2)
20	462.6750	2 W	12.5 kHz	50 W	25 kHz	(2) Unofficial emergency/ traveler assistance channel (PL 141.3)
21	462.7000	2 W	12.5 kHz	50 W	25 kHz	(2)
22	462.7250	2 W	12.5 kHz	50 W	25 kHz	(2)
	467.5500			50 W	25 kHz	(3)
	467.5750			50 W	25 kHz	(3)
	467.6000			50 W	25 kHz	(3)
	467.6250			50 W	25 kHz	(3)
	467.6500			50 W	25 kHz	(3)
	467.6750			50 W	25 kHz	(3) Unofficial emergency/ traveler assistance channel (PL 141.3)
	467.7000			50 W	25 kHz	(3)
	467.7250			50 W	25 kHz	(3)

Notes

- (1) Shared FRS and GMRS simplex.
- (2) Shared FRS and GMRS simplex, GMRS repeater output.
- (3) GMRS repeater input.

Appendix: FRS_GMRS